# SUPPLEMENT.

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

**FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.**

No. 1769.—Vol. XXXIX. LONDON, SATURDAY, JULY 17, 1869. {STAMPED .. SIXPENCE. UNSTAMPED, FIVEPENCE.


## CRADDOCK'S IMPROVED HIGH AND LOW-PRESSURE ENGINE.

Fig. 1.

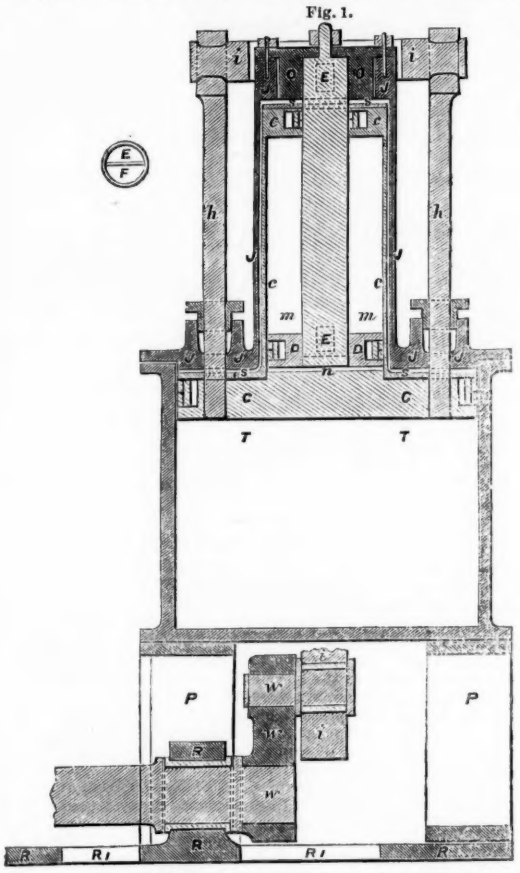



Fig. 3.

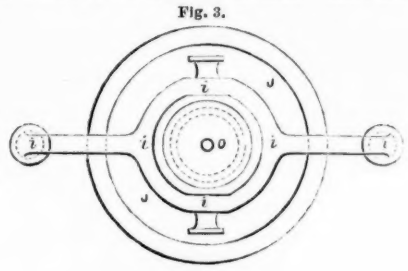
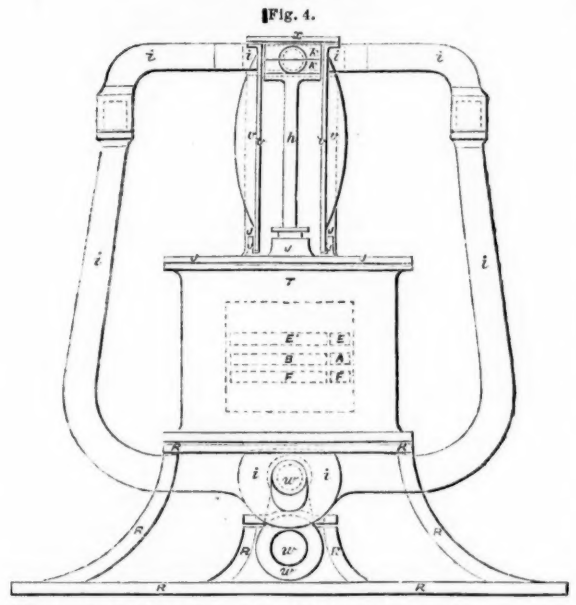



Fig. 4.




The scale of Fig. 1, the section, is ½ an inch to the foot; that of Figs. 3 and 4 the plan and elevation, is ¼ of an inch to the foot.

## Original Correspondence.

### CRADDOCK'S IMPROVED STEAM-ENGINE.

SIR,—Well knowing the desire for cheapness and compactness in the construction of steam-engines, I forward you the above sketch, from a drawing made by me in 1859. Until June 14 (only a month since) I have carefully kept the design to myself, hoping to have the means of turning it to some pecuniary advantage, but this now appears to be hopeless. I, therefore, send it to you for publication, in the hope that it will secure me the credit, if not the profit, of the invention.

The same letters refer to the same parts in all the Figs. *R R* represent the foundation plate, and *P P* the two supporting brackets, which carry the engine; *R'*, *R'*, show openings in the foundation plate for crank and eccentrics; *W* indicates the crank-shaft, crank, and crank-pin; *i i* the connecting-rod; *T* the low-pressure cylinder; *c*, *c*, *c*, *c* the low-pressure piston and high-pressure cylinder, in which, *D*, the high-pressure piston is held stationary by the pipe *E F*, which is made fast at *O O* to *J J*, which forms one part with the low-pressure cylinder-lid, and also forms a central part of the low-pressure cylinder, as the steam presses on all parts, as shown by *s*, *s*, *s*, *s* on the down-stroke, whilst at the same time the steam from the boiler is flowing through *A* and *F* under the fixed high-pressure piston *D*, as seen at *n*, whilst the steam from *m* is exhausting through *E* in the supporting pipe of the piston *D* to *E* in the valve-face, and then by the cross hollow of my steam-valve to the port *E E'*, which leads to *s*, *s*, *s*, *s*, and thus it is readily seen the two cylinders act in the same way as other engines of mine have done, unless when the cranks were set at right or intermediate angles.

On the valves reversing, the steam from the boiler goes from *A* to *E*, and through *E* at the piston *D*; it then finds the piston and cylinder, *c*, *c*, *c*, *c*, reversing to the up stroke, and the space under *c c* cylinder and *c c* piston reduced to such clearance as is now seen at *s*, *s*, *s*, *s* above them. Now the steam from *n*, in the high-pressure cylinder *c c*, exhausts into the low-pressure cylinder *T*, through *F*, in the piston *D*, support pipe to *F*, in the cylinder face; and by the cross hollow in my valve it goes through *F F'* to the underside of the low-pressure piston, *c c*. Whilst the steam from the boiler now passes through the port *E* on the high-pressure side of the valve to *E*, at the piston *D*, and that half of the pipe being stopped at bottom, as shown by the dotted lines, the steam from this half finds its exit into the cylinder above the piston *D*; and now, again, both steams are pulling the crank upwards.

The pipe *E* and *F* is seen divided in the middle (see Fig. 2) in the long direction, thereby making two passages. *F* is open to the under side of the piston *D*; and *E*, as described, is open to its upper side. The top of this pipe *E* and *F* is solid, as indicated by the dotted lines, and shown by its formation into a central bolt, by which it is firmly held in the recess formed in the part *o o*. But this part can have a variety of modifications given to it, so as to render what is shown as metallic packing a packing of the common kind, with ready access to it. There is an entrance for the steam into the *F* half of the pipe (see Fig. 2), similar to that shown at *E* to the *E* half; but, as before said, the *F* half is open at the bottom. At *h h* is seen the two piston-rods coupled to the connecting-rod, *i i* (see Figs. 1, 3, and 4). Thus this connecting-rod, by the form given it, not only receives all the power direct into itself, and conveys it direct to the crank-shaft *W*, but it works in space heretofore wasted.

All points are now made clear by lines, reference letters, and this description; it is only further necessary to say that the valve-face is shown in dotted lines, as the reader will see it should be on the opposite side of the cylinder. I have a view with the piston *D*, supported from the bottom of the low-pressure cylinder; in such case the metallic packing is in the centre of the low-pressure piston *c*, *c*; and the steam from the boiler goes to the bottom of the engine, instead of the top, to enter the pipe *E* and *F*. This pipe I have also as two pipes, making a central and annular passage, which, of course, serves the same purpose as the one divided pipe. At the bottom of the connecting-rod *i*, *i* (see Fig. 4) at *W*, the crank-pin is let into and coupled to the connecting-rod, as shown, but that is but one among a variety of ways by which that can be done.

In the original sketch drawing the valves and eccentrics are all shown, but those matters are well known, and the common valves are admissible. With two cranks, *w* (see Fig. 1), clearing the sides of the low-pressure cylinder, *T*, and with the ends of the cross-head part of the connecting-rod, *i i*, elongated, a single rod (connecting rod), one on either side, would connect the power to the two cranks, and still retain the same space. Of course, the old side rod (connecting-rod) would connect it to one crank, but entail space for the purpose. But my connecting-rod and valve render this, as they do my other engines, complete. At *v v*, Fig. 4, is seen the guide bars, made fast to the low-pressure cylinder lid at *J J*, at bottom, and coupled at top by the part *x*, which also connects with the guide bars of the other piston-rod, *h*, and binds altogether firmly to the top of *J J*; and thus the engine becomes a solid mass, compact, yet simple, and economy of space is obtained without crowding of parts, or rendering parts difficult of access, and the heat is concentrated within a small exposed surface. *k k* represent split brasses, made fast to the head of the piston-rods, *h h*, which also serve as the guide blocks. These guide brasses are hereafter referred to as the point of extending the two low-pressure piston-rods, *h h*, for the purpose expressed. The sketch tracing, though it pretends to nothing more, will make all that is novel easily understood. The exhaust port, *B*, on the low-pressure cylinder face, acts in conjunction with my valve, as in the common practice, therefore nothing more need be said upon it.

We have here (supposing we do not desire to use a greater amount of expansion than we can get by the lap of the valve in the high-pressure cylinder) a double-cylinder engine, with one crank, one valve, one connecting-rod, and one eccentric, with the other recommendations given above, by which the steam can be expanded to fifteen times its original volume; and by applying the expansive valve, as is well known I have done, the steam can be cut off as early as we like in the high-pressure cylinder. Yet this has lain by me for ten years, and with all the rage for double-cylinders during that time none have seen it.

By merely extending the length of the rods, *h h*, from the top halves of the low-pressure piston-rods brasses, or guide-blocks (see Figs. 1 and 4), instead of a stationary high-pressure piston, we have the piston and cylinder in the common way, by merely connecting the three piston-rods together. Thus is presented a sound design; but we have the three pistons extending 2 feet higher at top stroke. In such case the high-pressure cylinder is that cast on the lid (but the centre metal in) of the low pressure cylinder, and not to the low-pressure piston, as seen in the engraving; as in such case the low-pressure piston and cylinder are also of the simple kind, and the cylinder seen fast to the piston is in such case not required. The high-pressure piston could be connected with the low, and the piston-rod, *D*, would in that case have its gland in the metal that would divide the high-pressure cylinder, *J*, from the low-pressure cylinder *T*.

THOMAS CRADDOCK.

41, *Friston-street, Ladywood, Birmingham, July* 14.

### HAULING COALS UNDERGROUND.

SIR,—Since the important discussion on this subject took place at the Northern Mining Institute, and the report was given of the committee appointed by the society on the same subject, considerable changes have taken place. The Endless Chain has been introduced at one of the collieries of Earl Vane, at Rainton, but beyond the general fact that it is reported to be working well, the public know nothing as to its performance there; perhaps some of your correspondents could enlighten us on this subject.

The Clip Drum for hauling has also been introduced, and several orders have been given for those drums (we refer to Fowler's Clip Drum, of Leeds) by colliery owners lately. They are used for self-acting inclines, drop staples, and for hauling underground. For the latter purpose they are used instead of working two ordinary drums, and having used one for this purpose, I can confidently say that they possess, in my opinion, several important advantages. First, the length of rope is considerably reduced by using the clip drum; supposing that the plane is 1¼ mile in length, in using two ordinary drums 7920 yards of rope is required to work the main and tail ropes while with the clip drum only 5280 yards are required for the same purpose, as the rope does not fold on to the clip drum, but only passes round it. It must not be supposed that the rope is always applied with this new drum on the endless rope system; on the contrary, it is now applied in many cases to haul from each end of the set, exactly in a similar manner to the mode used with ordinary drums, all that is required being to take up the slack by means of a hand winch for the *empty set* only, the full set being placed on a fall, which tightens the rope most effectually by means of the gravity of the tubs. I must defer further explanation as to this mode of hauling until next week, and will only further remark at present that a large drum has been lately applied at Cambois Colliery, which has to work to six different landing places.—*Newcastle, July* 12. M. E.

### THE MINERS' BENEVOLENT SOCIETY.

SIR,—My attention having been directed to the article contained in the *Mining Journal* of July 3 on the Hartley Colliery Accident Fund, in which you suggest that Mr. Frederick Smith, of Dudley, should inaugurate a fund in South Staffordshire and its vicinity, to be subscribed to partly by the miners, partly by the mine owners, and partly by the public, for the relief of widows and orphans of miners killed by accidents in the mines of those localities, I beg to submit to you a paper which I wrote in June, for the purpose of instituting "The Miners' Benevolent Society," to extend the advantages you propose, and some others, to the mines and quarries of the whole country.

On reading in the daily journals an account of the prominent part taken by Mr. Smith, on behalf of the miners, at the Birmingham "Hartley meeting," a friend of mine forwarded him one of my papers, and I am glad to say that Mr. Smith considers the general principles of the paper very excellent, and states that he shall feel a pleasure in doing what he can in furtherance of the matter.

Since then a few of the papers have been in private circulation, and the scheme proposed has invariably met with unqualified approval. "The Miners' Benevolent Society" has already got, for its age, a very respectable list of promised supporters. If the general outline of the proposed institution also meets with your approval I shall be obliged by your giving it publicity. An executive is in course of formation, amongst whom there will be noblemen and gentlemen nationally known and respected. Whilst the executive is being got together promises of future support and co-operation will be thankfully received.—*Enfield, July* 14. JOHN CAPES.

There is a class of calamity for which the ministering hand of benevolence has hitherto made no regular organised provision—"Accidents in Mines." There is no "Miners' Benevolent Society." Although mining is the most perilous of all pursuits, there is no institution that even professes to alleviate its misfortunes! It is true when a great catastrophe happens, when whole hecatombs of miners are at once hurried into eternity, the benevolent are aroused into action, and perhaps a "Mansion House Committee" is formed to receive and distribute many thousands of pounds for the relief of surviving sufferers. But such efforts are only made when the occasion is sufficiently sensational. Ordinary mishaps, which in the aggregate destroy or disable larger numbers, are not heard of.

The most dangerous of all mining is coal mining. In the highly civilised state we live in, coal mining is the most indispensable of all occupations. Without coals our people could neither be fed, nor clothed, nor housed. Without coals we should collapse as a nation both in arts and arms. "An Englishman's house is his castle"—his fireside is "the keep" of that castle. Without coals home would as cheerless as a heaven without a sun. Under Providence, in the miner's labour we may be said "to live, and move, and have our being."

Almost all the pursuits which minister to our wants and comforts are attended by agreeable as well as by disagreeable concomitants. The sailor who risks the perils of the deep for the purpose of either defending our shores or of bringing us the treasures of foreign climes, experiences many enjoyments in his vocation which all of us, more or less, might envy. The soldier leads a gay and pleasurable life, which largely compensates him for the occasional duties of the field. The agriculturist although exposed to the weather and to many disappointments, enjoys much sunshine, fresh air, and other exhilarating pastoral influences. The artizan amidst the wearing work of the factory is surrounded by grand machinery, the majestic movements of which are glorious to contemplate; he sees the beautiful work which by the aid of that machinery he has constructed, and his intelligence is pleased and satisfied—and so of almost every other pursuit, each, more or less, has its compensating surroundings. Not so the miner's. His life is mostly spent in "outer-darkness;" he gropes his dangerous way in the bowels of the earth; whilst at work there are no pleasurable surroundings to alleviate his toil; he labours in a sort of living tomb; and when his daily task has been accomplished there is neither form nor comeliness about the result to charm him into satisfaction. From the pitchy darkness of the mine, weary with labour, the miner after a brief interval above ground sinks into the night of sleep; this round of darkness seems to turn the miner from a citizen of the world into a creature of chaos.

Now, the sailor, the soldier, the agriculturist, the artizan, and all the rest have been more or less cared for by the fostering hand of benevolence—the miner alone has been forgotten. "Out of sight" he has been "out of mind"—but is it well that he should any longer so remain? Ought there not to be amongst the other glorious charitable institutions of the land "The Miners' Benevolent Society?"

There are many noblemen and members of gentle families who owe their wealth to the miner's labour, by whom such an institution could be easily called into existence, and, as the whole of society depends, day by day, on the miner's labour for supply of the necessaries and luxuries of life, such an institution it is to be expected would receive very general support. Or as the strong arm of the coal miner largely contributes to the revenues of the City of London, it would but be an act of grace for "The Miners' Benevolent Society" to have its origin in the councils of that influential corporation.

The perils of mining are so patent, and the catastrophe near Merthyr is so recent, that it seems a work of supererogation to go into statistics, for the purpose of showing the want there is of such an institution. It need only be stated that whilst an agricultural labourer's life averages 42·3 years, that of a miner only averages 27·7 years. Surely these figures will constitute sufficient statistics to show the room there is for "The Miners' Benevolent Society," and there are about 350,000 miners living under the deleterious influences which produce this low average.

The writer of this paper is no advocate for spending charitable funds in bricks and mortar, when the nature of the charity does not absolutely require such an expenditure. "The Miners' Benevolent Society" would want no such outlay. An office in London, with a secretary and clerk, would be all the establishment required. Life pensions should be granted to miners totally disabled by accidents in their calling. Temporary help should also be granted to miners disabled for a time by accidents in their calling. Pensions should also be granted to the widows of miners killed by accidents in their calling, to be regulated according to circumstances. Such pensions to be for life to aged widows, or to such as from any cause are incapacitated from work, but to be for a period only to able-bodied widows, and to be renewable according to circumstances. Orphans left destitute to be provided for by the society, by being placed in existing orphan schools as "paid-for pupils." The aged parents of miners either killed or disabled by accidents in their calling to be eligible to receive the benefits of the charity.

The system for working the Miners' Benevolent Society would be the same as the system by which the Royal Agricultural Benevolent Society, and the Royal Medical Benevolent College are worked—by the agency and co-operation of honorary local secretaries. These gentlemen would be chiefly resident in the mining districts, and it would the policy of the London board to keep up a spirit of emulation amongst them, so that they might vie with each other in promoting the interests of the charity.

In addition to this system, every mineowner would also be invited to induce some person connected with his mine, and in good repute with himself and the miners, to accept the office of honorary agent to the Miners' Benevolent Society, for the purpose of collecting 1s. annually from each person employed in the mine. If every mine so contributed, 350,000s., or 17,500*l.*, would be collected—no small addition to the society's revenue. At the periodical election of pensioners each mine would have as many votes as it had contributed guineas during the previous year. In the event of any very terrible catastrophe happening, whilst special donations were asked for from the general public, it would be possible to make a second levy of 1s. during the year on the miners. Thus almost any amount of revenue required would be easily obtainable. Some arrangement would have to be made to prevent coal mines, by reason of their numerical superiority over other mines, from having too much power at these elections of pensioners. When candidates presented themselves from mines that had not contributed, the fact would be mentioned on the polling-papers in connexion with their names; it is probable in these cases that both the contributing mines and the general body of govenors would withhold their votes from such candidates. This in time would bring every mine into co-operation with the society.

This auxiliary system of "self-help" would add greatly to the popularity of the Miners' Benevolent Society. The institution would present also another favourable feature as contrasted with some charities—it would be impossible for the idle and the bad to impose upon it. The funds of the Miners' Benevolent Society could only be got at through the medium of serious accidents, which no miners would risk in order to provide for their wives and families.

Gentlemen who read this paper are invited to write their names and addresses and the amounts they are willing to contribute, either as donations or annual subscriptions (or both) in the accompanying schedule. The amounts so set down will not be payable until the Miners' Benevolent Society has been fully constituted.

## THE SOUTH STAFFORDSHIRE AND SHROPSHIRE COAL FIELDS—No. VIII.

### HOW AND WHEN WERE THEY DENUDED?

SIR,—I offer an opinion with regard to South Staffordshire with diffidence, but at the same time with a willingness to contribute my mite to the treasury of a very intricate science, and also as one who would be more pleased to find his fears with regard to the limits of the midland coal fields groundless than confirmed. It is difficult to read backwards the physical history of a country, and the more so when so many causes are proved to have been in operation, sometimes at different periods, at others at one and the same time; now building up and then taking down, and causing endless elevations and subsidences in turn. There is this difficulty, too, after having settled the thing in one's mind, of clothing it in such decent garb as shall fit it to appear before the public. That the "Black Country" was once a nearer neighbour to salt water than at present will be admitted; but, whether it formed one of the group of Palæozoic islands alluded to in a former article, as at one time emerging from the Red Sandstone sea, is another question. It would not, of course, be conclusive to say, because in piercing the earth's crust we find volcanic grits interstratified with rocks formed during or immediately subsequent to the deposition of the coal measures, that proof exists of a disturbing force sufficient to cause so considerable an elevation. It is well known, however, that beds of volcanic grit do occur, and that they occur in positions which indicate eruptions at periods earlier than that at which the greenstone and basalt at Barrow Hill and the Wren's Nest played such havoc with the coals, in the very centre of the Staffordshire field. In passing through the 33 yards of strata which cap the coals in the old Congreaves Colliery 8 yards of such grit were passed through, besides two similar beds lower down; and, supposing these not to have been the result of the grinding up of older beds, and consequently a mere displacement, but that of accumulated volcanic materials not far off, they at least show a disturbing tendency by means of expansive internal heat, which might have been accompanied by a simultaneous elevation of the surrounding ground. The probability is that elevation preceded the irruptions, or eruptions, rather than that they were simultaneous, as it is reasonable to suppose that it would be when the rocks themselves had been heated, swollen, and broken, that the volcanic matter would find relief through the crevices made; and when it is considered that such disturbing agency must have travelled through such very thick underlying beds before it reached the coal measures, and must have expanded them, and thereby caused them to occupy a greater bulk, one may understand some of those rolls, and swells, and arches seen in the coals; also that there must have been such a gradual rising of the strata above the waters as would immediately lead to denudation. New positions would be given to the newly-formed coal measures, and probably such as would favour the erosive action of sea breakers, tides, or currents upon surfaces which till then might have remained as the building up processes left them.

It might not seem very consistent with this view that similar green volcanic grit was found below 260 yards of red rocks, where Earl Dartmouth's pits are sunk through the Permians at West Bromwich, but the inconsistency is apparent rather than real, as these pits prove also that from 500 to nearly 1000 feet of upper coal strata had been cut down and destroyed before the deposition of the red rocks commenced, pebbles of coal and of coal-measure sandstone having been found at the bottom of one of these shafts, on passing from the Permians into the carboniferous series of rocks, thus silently attesting the agency by which they suffered. It is quite certain not only from these, but from other facts, that somewhere about this period the coal measures were materially pared down and eroded, that—to use the word denuded in its true and literal sense — old surfaces were stripped and laid bare, the bulk of their covering being removed and thrown down at a distance, where they formed those worthless seams which have tempted many to believe they were the legitimate coal measures; and such changes require us to believe, undoubtedly, that equally long periods of time were consumed during these taking down and wasting processes as were previously required for building up. It is not improbable, however, it appears to me, that very many of even the larger faults in both fields were not so much the result of elevations by means of volcanic efforts as of that shrinking and re-arrangement of strata that took place over very large areas, which terminated the carboniferous period. We have seen how the Silurian rocks were tilted and worn into cliffs and beaches by waters of the coal measure period in South Staffordshire and Shropshire, and how it was no less evident that such process was gradual, and that on this raised Silurian flooring were laid the accumulations of a vast coal country, including three or four Welsh and as many other counties west of the Severn and north of the Bristol Channel. It is known, not only from evidence these counties afford, but from that which others west and south supply, that at the close of these coal measure accumulations immense disruptions took place, which were brought about in all probability by a succession of shrinkings and depressions, to an extent unequalled either before or since in the history of the coal measures; a catastrophe so great that portions of strata were tilted high above the water, whilst others were hurled deep down beneath, altering the previously prevailing conditions of land and water, and of the atmosphere itself; so much so that we miss the results of that rank vegetation such as distinguished the old coal measure period. The extent of these changes is shown by the fact that from 5000 to 30,000 vertical feet of strata, reaching from the top of the coal measures downwards, 50 miles in extent, were affected, and the period most favourable for the growth of carboniferous vegetation closed. Whether these changes were the result of elevation, or of sudden or gradual, but gigantic, collapse and depression, it is quite clear that they led to the work of denudation upon an extended scale, and to denudation under such favourable conditions that it would be but reasonable to expect a corresponding construction of new strata in easy depressions, in quiet seas, or where gentle currents only flowed; also, that the new deposits would be the equivalents or representatives of those destroyed, such as the newer and less valuable carboniferous beds which lie upon the dismembered edges of the old coal measures, which in former articles have been pointed out as existing above and around the old coal fields of South Staffordshire and Shropshire.

However lavish Nature may be of her forces, she is enonomical in the use of her materials, often using them over and over again in her structures, which are sometimes inferior to her first. Looking at the vast heaps of strata disturbed, and the immense pressure, both vertical and lateral, which would be brought to bear, one need not be surprised, as we before said, at the contortions, flexures, faults, fissures, trough faults, or unconformities met with in coal strata, and rocks adjoining. Without professing to be well acquainted with the South Staffordshire faults, I may say there are two sets, and that two out of the four of these great rents run north-north-east, crossing the others running north-north-west, at angles of 45°. The Great Shropshire faults run pretty much in the same directions, following the great line of disturbance caused by the elevation of the Wrekin, the Lilleshall, and the Caradoc Hills. Of course, there are cross faults, but these, for the most part, are not prolonged; the great lines are in the direction pointed out, and they conduct you, step by step, from the igneous rocks of the Wrekin to and around the trap and altered rocks on which underground the coal measures rest, till you arrive at the boundary of the field, where the red rocks set in, and even then the same parallelism we believe is continued, more or less.

I submit that these lines of fault were not all the result of elevation, that some might have been caused by such depression and collapse as we have hinted at west and south. It will be observed, too, that although, like an indented coast line, the great Symon or boundary fault runs in and out along the edges of the coal measures, it maintains pretty much the same direction as the slip faults or fractures; and supposing the trough of the depression to have been somewhere midway between the Coalbrookdale and South Staffordshire coal fields, the water would naturally find its way in this direction, and set to work upon the disruptured coal measure: acting as a natural saw, it would cut down seam after seam on either side, and destroy them, and wherever such water flowed, deposits somewhat resembling the missing members would be forming. That this period of depression continued for some time is evident from portions of the new measures formed on rocks south and west of the Severn, from which the older ones had been entirely swept; whilst here and there, sometimes on the east and sometimes on the west side, we find them resting upon the lower denuded seams themselves. Indeed, the general tendency during the subsequent formations of the Permian and Red Sandstone rocks continued to be one of depression, although instances occur in which these seas cut deep into the coal deposits, thus adding to the extent of denudation.

It may be that the progressive changes of level were so gentle that the subsequent unconformability between the beds would be so slight as to be scarcely perceptible, but whether perceptible or not it must be admitted that, just as the coal measures had been formed on eroded Silurian beds, so the Permians were in turn deposited in hollows worn in the coal measures, and the New Red Sandstone in hollows scooped out of the Permians.

It was thus, it appears to me, that the original coal measures were denuded, and a bastard offspring the result, the latter being attacked in turn, and partially destroyed by the Permian sea, the deposits of which were afterwards as vigorously attacked by the waves of the Red Sandstone sea, the result being that the coal measures having suffered each time the denuding agent succeeded in cutting through the rocks, they were pared down to mere relics of what they were, with here and there a few measures left sufficiently low to escape the fury of the waves, and stretching miles beyond where others terminate, similar to those prolonged lower measures found in the direction of Cannock Chase.

J. RANDALL, F.G.S.

*Madeley, July* 13.

## TUNNEL-RAILWAYS, AND BRIDGE-RAILWAYS.

SIR,—Will you permit me a short space to refute the argument of the scheme of your correspondent, in last week's Journal, for connecting England with France by railway communication? For him ever to think that this will be effected by a bridge is as preposterous as it is impossible. Only imagine a bridge 23 miles in length and 20 feet wide, constructed on piles 300 feet high, across the South Channel. Then, as to the cost, who can estimate the amount? Peradventure, where it possible to succeed to a certain extent, after two or three years incessant labour, a hurricane, such as sometimes visits the south coasts in winter, would unquestionably sweep every vestige into annihilation.

A tunnel is both practicable and possible. Its cost can be estimated, and the time for its completion computed with some degree of accuracy. Every yard as explored can be made perfect. Ventilation can at all times be depended upon, and when completed a safe and permanent communication will be opened up. His Imperial Majesty the Emperor of the French perfectly understands this great scheme, and has signified his intention to give it his support. The English Government will also, in all probability, approve of the scheme. The only question of importance appears to be the "Guarantee:" this I think is merely nominal—the completion of the tunnel after once commenced is certain.

A MINER.

## SAMPLES AND SPECIMENS.

SIR,—It was with considerable interest I read in the Journal of a few months since some excellent strictures, under the *nom de plume* "G. J. G.," relative to the expediency of more care being taken in *averaging* specimens submitted for assaying. I do not consider the distinction your correspondent suggests to be made, although proper in itself, one likely to become of general adoption in the mining world, at the same time I quite agree with him in the importance of specifying in prospectuses, &c., when the results of assays and the names of the assayers are given, by whom, and under what circumstances, the *samples* were taken. Nothing can be better or fairer than the manner in which "G. J. G." took the sample referred to, but how shall we characterise the conduct of the persons who suppressed his legitimate report, and published as *average* results that upon *picked* specimens. I can truly sympathise with "G. J. G.," owing to a friend of mine having a few years ago experienced similar treatment at the hands of a large London company. By them he was sent abroad to inspect and report upon their property. On commencing to sample and assay he found the results very discouraging, but being reluctant to damage the company by a prematurely unfavourable report he instituted upwards of 250 assays on samples obtained from every part of the mine (over 2000 ft. of tunnels having been then driven), and also from the dumps, which had been represented as worth 10,000*l.*, before he would commit himself to a decided opinion, which culminated in the conviction that *the company had not a ton of ore in sight, or on the dumps that would pay for working*. Results have verified the correctness of his report, the mine having since been abandoned, and the company re-organised under a new name.

Notwithstanding this important announcement of my scientific friend, the shares of the company went up above 100 per cent.—from 5*l.* (par) to 12*l.* 10s., and remained so many months after receipt by the directors of my friend's report. The fact was the report was suppressed, and the results of a few assays of exceptional specimens were printed and circulated amongst the shareholders, and, I infer, through them distributed to the general public, as in the instance specified by "G. J. G." I may just add that this and analogous examples may enlighten the uninitiated shareholder upon the discrepancies so frequently apparent between the statements set forth in prospectuses and the actual practical results, and which the *indignant and deceived* (?) directors generally attribute to the ignorance, error, or misrepresentations of their resident agent, and which ends in his ignominious discharge upon the strength of some trumped-up charge, or his voluntary resignation. The moral to be learnt from this veritable statement is obvious. Let every important mining corporation have an honest and competent assayer stationed on the property, the assay office being the mirror of the mine. Make it the duty of this officer to keep an accurate record of his assays, and render to the company a detailed copy of his labours periodically. (This, by the bye, was done in the case referred to.) The assayer's report should be open to the inspection of the shareholders at any moment, on application to the secretary, or be laid prominently upon the table of the board room. The adoption of such a course would have a most salutary effect; it would remove a prolific source of mistrust and disastrous litigation, inspire confidence, and tend most materially to advance the success of legitimate investment in the most natural and national means of fair and honest speculations in this great commercial country—MINING.

INVESTOR.

## NEW FIRE-ENGINE—HYDRO-PNEUMATIC PUMP.

SIR,—This invention is for the purpose of raising water from a rivulet to the summit of a hill or tower, from thence to be conveyed by a main pipe to the residence of any gentleman in its vicinity, then, from the termini of the main, to be distributed through branch pipes (arranged similar to gas pipes) to every room in the house; in the case of fire each apartment will be furnished with a powerful jet of water by simply turning a tap, and thus arrest the progress of the devouring element. Should the fire have made much progress before it was discovered, an elastic hose should be latched to the main pipe, and bring the whole power of the water of the reservoir to bear upon the flames, thus saving valuable works of art and other property, which in cases of isolated fires have too often been condemned to utter destruction, nor is its utility in supplying household requirements and beautifying pleasure grounds, by supplying jets of water for fountains and artificial cascades, far less valuable than its services in case of fire. The hydro-pneumatic pump is also valuable for mining purposes, for wherever a small stream of water can be found it will compress air for working machinery with a force equal to steam where coal is too distant from the workings, or too expensive to be employed with profit, it will form a perfect substitute for steam. The hydro-pneumatic pump is self-acting, requiring no attendant when once set up; its construction is simple, and not costly. It is worked by water alone, requiring only a fall of 6 ft. to raise a column of water 500 ft. from its original level, or compress air to the extent of 225 lbs. on the square foot. I shall be happy to furnish further particulars respecting this invention in answer to any enquiries which may be made through the Journal.

J. C.

## PROF. SMYTH'S LECTURES AT THE ROYAL SCHOOL OF MINES.

SIR,—The students at the Royal School of Mines were all very pleased that you published in the *Mining Journal* last Saturday so much of the results of the examinations, and only regret the gentleman who forwarded you the names did not give the complete list. Some of us, also, are anxious not to be reckoned in Mr. Page's "we," when he says "*we* have long thought our school is almost quite unknown to the public." The "we," of which I am a fraction, don't understand "almost quite;" but as regards publicity, I am sure that we all feel grateful to the *Mining Journal* for its reports of our lectures, and the steady support it always gives to this important national institution. "We" (and this time I think I may include Mr. Page) perfectly agree with the remarks of your leading article last Saturday as to the increasing necessity in mine managers for economic mechanical and scientific skill; and we are all anxious to avail ourselves of the valuable lectures of our professors.

A STUDENT.

*School of Mines, Jermyn-street, July* 12.

## COPPER AND LEAD MINING.

SIR,—At last there seems to be a chance of the price of copper getting up. The great drop which took place in this article since the panic of 1866 has caused a fearful loss to the mining interest generally. Mines a few years ago paying from 10,000*l.* to 40,000*l.* annually, through the great drop in price have not been able to sustain themselves, and a vast number of mines ceased to exist altogether. The once very rich mines in the island of Cuba, we are informed, as well as several mines in Chili, are wrought to such a depth that even were copper at double the present price they could not pay. All the greatest copper mines appear to be nearly exhausted simultaneously, so that the production of copper at no very distant period must greatly fall off. Holders of stock will do well to remember this circumstance; and, had not the markets of Europe been over stocked, the price of copper would at this moment be, most probably, 30 to 40 per cent. higher than at the present time. Capitalists will do well to understand that the greatest profits are realised by the discovery and working of new mines, and not the re-opening of old and nearly exhausted mines. This doctrine applies to every country, with few exceptions.

Copper mines, as a rule, have not been found to pay at a greater depth than 200 fms.; and when the mineral falls off in quality or percentage it is a sure sign that the quantity is getting less. This has been found in the great and once celebrated mines which yielded several millions sterling profits, but now nearly numbered with the past. In lead mines the average percentage of lead raised from the lime formation is from 70 to 80 per cent., and I have known it as high as 82; but the price obtained for lead ore depends upon the quantity of silver the ore contains. In the clay-slate districts as much as from 100 to 200 ozs. per ton has been met with, but not generally more than from 20 to 60 ozs. on an average. New districts should be explored as they are opening up, where no doubt as valuable deposits of minerals lie dormant as any yet discovered; every year points out such to be the case.

The great secret is to discover minerals with as little outlay of capital as possible, and this I have helped to do successfully in several instances, fortunately in copper mines as well as lead mines. It does not follow that because one great mine is found in a district there should be ten others; the contrary with lead in every instance has invariably been the case. No second East Rose has been found, no second Chiverton has yet been met with, and the probability is greater mines than these will be found and are to be discovered. Numerous deposits of minerals of every description now and then are found in the shape of an egg in tin districts, called carbonas, or floors. Copper is also found occasionally where two or three lodes form a junction, in immense quantities. In the Island of Anglesea a large deposit of copper ore was met with east of a large cross vein or lode, which terminated about ¼ mile further east, in the shape of a wedge, and no further trace of the mineral could be found.

*July* 14.

A. BENNETT.

## MINING INTERESTS OF COLORADO, U.S.A.

SIR,—I beg to place the following interesting extracts from our last correspondence from Colorado at your service.

WM. POPE.

*British and Colorado Mining Bureau, London, July* 15.

*Georgetown, C.T., June* 25.—A large force is at work on the Teats Mine taking out the best ore ever produced in Colorado. An assay made a few days ago by Herr A. Von Shultz gave $2900 in silver to the ton; this is, of course, an exceptional case, but the mass is extremely rich, and almost every piece shows native and bubble silver. The result of the treatment of 93 tons of second-class equator ore, by Huependen and Co., was $149·72 per ton; 78 per cent. of fire assay. Richard Snaire and another man, whose name I did not learn, have discovered another lode, situated 200 yards north of the Prize Mine; the shaft is 20 feet dip, and the pay streak very narrow, 3 to 5 inches; but it is worth $1 per lb.; this, if it should not open out, will pay handsomely. Also another rich discovery has been made on Sherman Mountain, about 300 ft. above the Snowdrift Mine; the crevice is decomposed, contains a large quantity of rich silver-bearing material, is fully 4 feet wide, and has the same direction as the drift. The owners will have a test run of selected ore made in a short time, and I predict that the "Sterling," as it is called, will be quoted as one of our first-class ores before many days.

One by one the old miners are returning to the Range to resume work on their old claims. Mr. Martin Marsh left last week for Buffalo Flats to make another raise at the sluice-box. There is area for 5000 or 10,000 miners to make fine wages, if not fortunes, in the diggings of Gilpin, Clear Creek, Boulder, and Summit counties this summer and fall. The Gilpin County and Coaley lodes, situate in Silver Gulch, at the back of Prof. Hill's works, Black Hawk, are not only excelling everything in the silver line hitherto found in Colorado, but anything yet produced in the United States. A few years ago a mine was found in Mexico of the same character, and with this exception they are unequalled; for 100 ft. along the drift of tunnel the vein of rich ore appears. It is largely galena and zinc, with masses of native silver or metallic silver, with not more

than 10 per cent. of other matter. Scarcely a piece of it can be picked up which is not full of native chloride and sulphuret of silver. Dr. Blatchley, who has always been preaching up Nevada, acknowledges that none of the States or Territories of the western slope have ever equalled this in the quality of ore.

My next communication will announce the particulars and departure of my first shipment of Colorado ore to England, to be continued through the summer. Doubtless the Swansea smelters will find out a more profitable mode of treatment for them than the imperfect one adopted here, and the results will astonish our friends in Colorado, and induce many thousands of tons to be sent *via* the Atlantic and Pacific Railroad to you, if I can only get them to reduce their freight rates to New York a little.—R. O. OLD.

## COPPER MINING AT LAKE SUPERIOR, AND ITS PROSPECTS.

SIR,—I have not been able lately to contribute so regularly to your columns as I would have desired, but I cannot refrain from offering a few remarks on "Copper Mining, and its Prospects," from a Lake Superior point of view—a letter from Mr. A. Bennett, in the Journal of June 5, having drawn my attention to the subject. It is now about two years since the low price of copper began to seriously affect the number of working mines on the Lake. Men began then to look around for some remedy, and in an increase of the protective tariff on the imported metal it was thought there was a sure cure. This was applied for, and refused, and then economy and retrenchment became favourite subjects. The winter of 1867-68 was a hard one; the working man bore his proportion of the adverse state of things, but even then the stockholders in many instances had to come to the rescue, and contribute the needful in the shape of assessments. Since that time there has been no permanent improvement. Last fall an increased tariff was allowed; copper then stood at 24 cents per lb. By or through speculative influences the price advanced to 27 cents, and we began to feel that the hope so long deferred was about to be realised. Good times were anticipated, and the question of a rise in wages, whether it should be 10 or 20 per cent., was discussed, not only among the working population, but by at least one of the papers of the region. A reaction in the price of copper again left it at 24 cents, and as the metallic barometer fell, so the companies who proposed resuming suspended mines began to think it time enough yet. Another reason why mines did not start up into activity was the scarcity of men, and this, in the writer's opinion, will be felt more and more. The Marquette iron region is enjoying a prosperous season, and from the abundance of the mineral should continue to do so. The iron mines are only a day's journey from the centre of the copper region, and being in a position to pay higher wages than their less prosperous neighbours, they are gradually absorbing the population. This fact only keeps wages in many of the copper mines at fairly remunerative rates, for they have to struggle for an existence as much now as in any time past. Late advices quote copper at 22½, and even as low as 22 cents; if these rates prevail during the summer it is hard to tell what mines will continue to work. From present appearances I do not gather much comfort, and the future appears equally clouded. Unless copper advances in foreign markets the tariff can do us no good at home, for the supply is more than equal to the demand, and Chili seems determined to do most of the outside business.

I will briefly give you an idea of what mines are at work on the Lake, and can at the same time state their prospects and products.

The HECLA leads the mines of Lake Superior; it is a new concern, having produced before this year but little copper. The mine is worked on a belt of conglomerate, that extends through the country for miles, and is, by the way, an integral part of the formation; the lode or belt is from 8 to 16 ft. in width, carrying copper for its whole width and length so far as opened, and yielding at the stamps about 5 per cent. of metallic copper. There are two principal working shafts at the north end of the property. Others are being sunk at regular intervals going south, in which direction there is a mile of explored conglomerate, said to be richer than ever; at any rate, the south part of the mine workings are the richest. The depth attained is about 300 ft., and no falling off is noticable in the quality of the rock produced. The company are working a stamps-mill, containing three heads of Ball's stamps. The mill is situated on the Lake shore, and connected with the mine by a railway of six miles a locomotive is used to transport the rock. The returns have been regularly increasing; last month the stamp copper produced was 250 tons of 75 per cent. mineral, for June it is announced, and expected, that the returns from the mine will equal 400 tons. There seems to be no end of copper, it only being a question of reducing power to bring it to market.

The CALUMET is on the same belt or lode, and is nearly as rich, but the width of the conglomerate is less, being from 4 to 12 ft. This is the oldest mine of the two, but has not attained greater depth. The stamping-mill is on the property; it contains two heads only, and more water will have to be obtained to increase the number of heads. But for this, there is no reason why the Calumet—for a time, at least—could not produce as much copper as the Hecla. Last month the product was 175 tons, this month 250 is promised by the officials.

These mines adjoin. South of the Hecla nothing is at present being done. North of the Calumet, and about a mile distant from the workings, is the SCHOOLCRAFT MINE. This is on the same lode, but at the point where work is being carried on it rarely exceeds 8 ft. in width—generally about 4 ft. At the first level the rock yields a little over 2 per cent. It is stated that at the second level, which is just reached, the conglomerate is wider, and carries more copper. They are working 20 heads of stamps (California style), and stamping about 50 tons daily. The product has been from 22 to 25 tons per month, to be increased when more stamping power is obtained.

Probably the last-named mine cannot more than meet expenses, but the two others, at outside rates, can put ingot copper in the market at from 10 to 12 cents per pound. On this conglomerate no active operations beside are being carried on; but on a parallel belt, 2050 ft. apart, are the lodes. At a distance north of the Schoolcraft about four miles the ALLONEZ is being opened on a conglomerate 40 ft. wide. This concern is new—has no machinery. Its riches are spoken of as being fabulous.

The QUINCEY stands next as a producing mine, and is the representative of the mines on the Pewabic lode—an amygdaloidal belt, running parallel with the conglomerates before spoken of. The Quincey is sunk to the 13th level, and for years has been producing about 100 tons of copper ore per month. In carrying on the workings a part of the lode split off, and went away in the side unnoticed; by cross-cutting this has since been found standing whole and rich in several levels. This places the mine in a good position. They have increased the product to 120 tons per month. Last year they made money, divided $40,000, and can undoubtedly weather out with copper at less than 20 cents.

The PEWABIC is a mine sunk to the 17th level. It has been for many years yielding over 100 tons per month, but the copper ground is now shorter, and the mine getting deep. Last year they claim to have met expenses on about 700 tons for the year's product. The yield now is about the same rate, but it must be tight scratching now to make both ends meet with copper at 24 cents.

The same may be said of the FRANKLIN, which is on the same lode as the Pewabic and Quincey. Last year they took out about 1100 tons of mineral. The mine is sunk to the 10th level, and the monthly product this year has been from 75 to 85 tons.

The three last mines named are not entirely dependent on stamping mills for a product, as each of them produces barrel and small mass copper. Each of them, however, are well equipped with stamping power. The Franklin and Pewabic use Ball's stamps, the Quincey the Cornish stamps. The Franklin has a locomotive for taking the rock to the mill, which, like those of the other two mines, is situated on the lake shore.

The SOUTH PEWABIC is a large mine; this was laid out for a "big thing," and no expense was spared to make it successful. Before any stoping was done the shafts were sunk to a 3d level, and levels opened continuously for 1000 ft. in length; this, in a lode averaging 12 ft. in width, of uniform character, and producing nothing but stamp copper, a mill of 4 heads of Ball's stamps, capable of treating 400 tons of rock per day, and consuming 32 tons of coal in the same time, was erected and connected with the mine by five miles of railroad; in fact, everything was done for economy and dispatch, at an expense of $700,000, before any returns were made. The yield of the rock has not answered expectations, it being nothing over 1 per cent. of ingot. They claim to having made a small profit for the last few months, while the returns have been from 110 to 115 tons of copper month. At present prices they cannot sustain themselves. The foregoing mines, as well as the HURON, producing 50 tons per month; Isle Royal, 20 tons; Sheldon Columbia, 20 tons; Grand Portage, 15 tons; and Hancock, 20 tons, are in the Portage district. Those last-named have not been meeting expenses, and any reduction in the price of copper will make matters worse. On the other hand, a moderate rise in price would put them out of difficulties, and give them that position which they have long been struggling for.

In Keweenaw county the mines are productive principally of mass copper. My last communication stated the depth and extent of each. I might, however, repeat some of the principal points in connection with them. The best mine at this time is the CENTRAL, for last year they took out about 1100 tons. The mine is still rich, and making good returns—about 100 tons monthly. The deepest level is the 10th. Central made a profit for 1868 of $110,000. Probably this mine will rub through as hard a time as any on the Lake, their resources, or rather reserves, being the largest in proportion to the amount of copper taken out.

The CLIFF is sunk to the 17th level, last year took out about 900 tons of mineral, and earned a profit of $60,000.

The COPPER FALLS is sunk to the 6th level, took out last year 800 tons, have since stopped a part of the mine that could not be made to pay, and are now taking out about 30 tons monthly.

The PHŒNIX MINE is in an improving state, as yet have not made very heavy annual returns, but lately have been taking out from 30 to 40 tons per month, and, probably, meeting costs.

The ONTONAGON MINES are under a cloud, waiting for better times; none of them are making returns in excess of 20 tons per month, but some are reported as looking well. This county, in three years, must have lost one-half its population.

Probably more copper is being raised on Lake Superior than ever before, and no matter how low the price may be, I do not think that the amount produced would be less than for years past. A mine that would produce 100 tons of mineral per month has heretofore been considered a first-class mine; but since those mines on the conglomerate have commenced to make returns the others take a secondary position. It looks as if in time those mines would absorb the others, and take upon themselves to supply the United States with copper. At any rate, should copper recede to 20 cents, and there stick, it is easy to imagine that the number of mines that will continue to work in this region will, with present rates of wages and cost of supplies, be very limited. The following is a list of the mines and their yield at this time:—

| | Tons per month. |
|---|---|
| Hecla Mine (Houghton Co.) | 300 |
| Calumet Mine (Houghton Co.) | 200 |
| Quincey Mine (Houghton Co.) | 110 |
| South Pewable | 110 |
| Central (Keweenaw Co.) | 100 |
| Franklin (Houghton Co.) | 80 |
| Pewable (Houghton Co.) | 60 |
| Huron (Houghton Co.) | 50 |
| Cliff (Keweenaw Co.) | 50 |
| Phœnix (Keweenaw Co.) | 40 |
| Copper Falls (Keweenaw Co.) | 28 |
| Isle Royal (Houghton Co.) | 25 |
| Sheldon Columbia (Houghton Co.) | 25 |
| School Craft (Houghton Co.) | 25 |
| Hancock (Houghton Co.) | 20 |
| Grande Portage | 18 |
| Amygdaloid (Keweenaw Co.) | 2 |
| Minnesota, National, Evergreen Bluff, Ridge, Aztec, Knowlton, Caledonia, Nonsuch (Ontonagon) | 100 |
| Total | 1343 |

This mineral can be valued at an average of 80 per cent., for I am satisfied that I have set down several of the mines low—below the average of the last five months. MINER.

*Keweenaw, Michigan, June 26.*

## MEXICO AS IT IS, AND AS REPRESENTED.

["MEXICAN BONDS, and the concocted *coup d'etat* in the *New York Times* of June 26," published in *Public Opinion* of July 10.]

SIR,—A friend of mine, who is connected with Mexican mines, in a most alarmed state of mind placed the newspaper *Pubic Opinion*, of July 10, in my hands. I informed him that for many months back telegrams and letters had reached London, through American sources, purporting to prove the dreadful state of anarchy in Mexico, and that not one of those communications had been corroborated by letters. That I was certain that the information given by the *New York Times* was concocted. It stated that Juarez is no longer simple President of the Mexican Republic, but substantially Dictator, and these powers had been given to him by Congress. Two thousand military arrests had been made. Queretaro was already in arms. The State troops and Federal troops were encamped within gun-shot. That dark days have come in the Mexican calendar is clear, &c. This is, however, clear, that our Government is not free from responsibility for the present or the future condition of Mexico. That very right which we invoked to justify us in dethroning Maximilian, and expelling France, leaves a counterpoising responsibility upon us to aid, as far as possible, the restoration of tranquility and sound government in that Republic.

The last letters from M. Romero, Minister of Finance, from Mexico, received by a Minister to one of the South American Republics in London, refer to the most satisfactory state of matters between Congress and President Juarez. The present session had closed, and all parties greatly satisfied. He also states that he believes the Government will be triumphant in the coming elections for deputies to Congress. Reuter's telegram from New York confirms the expectations of M. Romero, the Finance Minister:—"Washington, July 12: Advices received from Mexico state that the general result of the elections has been favourable to the present Government." If in June President Juarez had been named Dictator it is evident he would not be striving to be triumphant in the coming elections in July. The question is, what is the object of all these false and concocted news? First, I believe they emanate from the clerical or Maximilian party, who are furious at the freedom of worship which was conceded to the country by Juarez and his Government, and the laws against processions and carrying the Host in pomp through the streets; and, above all, the prohibition to priests to wear the famous clerical hats and garments, obliging them to go about in a less conspicuous uniform; also, the fact that Juarez's Government has dared to allow an Englishman to open a large shop in the city of Mexico for the sale of English Bibles and tracts in the Spanish language. Then there exist many persons in New York who are desirous of reducing Mexican Bonds to as low a figure as possible, in order to purchase, as was the case a short time ago, when, through false news *via* New York, they went down 20 per cent. The last advices by French mail speak of everything progressing most favourably in that Republic.

Mr. Foot, second engineer of the Mexican Railway, who is at work on the lower portion of the line, advises, in his letter of June 12, as follows:—"Railway affairs look well; the line is now open to Santa Anna, on the Puebla branch, at a distance of 97½ miles from the City of Mexico. The works are being carried on vigorously, and in October we shall recommence the works on the lower portion, near the coast. The Mexican Government are paying the Railway Company the subvention of 112,000*l.* a-year with great punctuality."

*July 14.* HENRY SEWELL.

## LEAD MINING IN SCOTLAND.

SIR,—Having been on a tour of exploration in the South of Scotland, I was informed that some new mines had recently been opened up by a very influential company from the North of England, and that their prospects were good. To satisfy myself on this point I rambled over these newly-obtained setts, and was much surprised to see numerous large and well-defined lodes cropping out at surface, the backs of which are composed of beautiful quartz and rich gossan, and carrying lead, copper, and blende ores in good quantities, lead predominating. Adit levels are commenced to be driven from the valley into the mountain, on the course of of some of the lodes, where from 60 to 100 fathoms of backs will be obtained in these ends. Although not much has yet been done, good work for the last-named minerals is now being extracted; and, so far as practical judgment can be brought to bear, they will soon have large deposits of these minerals.

An engine-shaft is being sunk 7 fathoms from surface, on a large lode 15 feet wide, and the part of the lode being carried will produce at least 1 ton 15 cwts. of lead and blende ores per fathom. A finer lode I think I never saw. These lodes are embedded in beautiful clay-slate and elvan, and the country, for miles around, is highly charged with mineral. These mines are bordering with the Cairnsmore granite range, which is said to be 2000 ft. above the level of the sea. Large elvan courses of the best description traverse the property.

A nickel lode has also been opened out, and large specimens of rich nickel have been taken therefrom—a most splendid lode. There cannot, I think, be but one opinion, and that is that these mines will ere long become rich and lasting, and that, too, for a very small outlay. The mines are situated about six miles from the town of Newtoustewart, and two miles from the shipping port of Creetown; and the railway passes through the property, so that the facilities cannot be surpassed for the transit of minerals and materials. There are many other setts in the neighbourhood with equally as good features, and of as great promise, and I have every reason to believe, if opened out, will become lasting and rich mines. I may add they call these the champion mines, and they are well worthy of that great name. By your permission I shall have the pleasure of addressing you on this subject at some future time. AN EXPLORER.

## FAHLERZ AS A SILVER ORE IN ENGLAND.

SIR,—With regard to the letter inserted in last week's Journal, by Mr. Masey, alluding to mine of July 3 on this subject, perhaps you will allow me to state once more that the analyses given in my letter represent ore as got from the mine—not picked "specimens." To which I will now add that up to the present time I have never met with any argentiferous ore raised in Cornwall—*i.e., as got from the mine*—which has yielded much more than 0·2 *per cent.* of fine silver. The *best* ores sampled containing fahlerz gave 50 to 70 ozs. per ton.

*Putney, July 10.* T. L. PHIPSON, Ph.D., F.C.S.

## LEAD AND COPPER MINING IN WALES.

SIR,—Having some idea of the public interest in this subject, I am induced to offer a few remarks on a district which seems at the present time to absorb a large share of attention from the fact of the discovery of the now celebrated Van Mine. And although I would caution investors not to calculate on a "Van" at every point of exploration, and speculators not to draw too largely upon the "name," I, nevertheless, think there is a wide and profitable field for the investment of capital in the comparatively new mining district to the north-west of Llanidloes. Much has been said from time to time on the powers of some very clever men, who, by the mere stroke of their pen, could trace into their own mining grants the Devon Great Consols lode, with a large imaginary share of its famed productiveness, although situated some 20 or 30 miles away. And now, again, we may read almost daily of the discovery of the Van lode 100 miles away to the north, or wandering westward into Cardiganshire, and found silently doing the "correct" thing at this season—visiting near the Devil's Bridge.

Well, Sir, such are the charms attaching to aristocratic mining names, and such is the erratic character of rich lodes. But the fertile imagination of man, however magnificant, nor his cupidity either can alter facts; nor has Nature distributed her beautiful riches to suit the whim of a few of the period, but wisely stored them to be available from generation to generation throughout all time. But I am wandering away. I will now turn into the Llon, and mount that splendid hack, and take the mountain road straight up from the Bridge; and, having gained the highest point, I have on the right the great VAN MINE, which is now producing such fabulous riches in lead. And as if the old familiar Cornish phrase had been transferred to Wales, a little altered, we may find in this district, instead of "fish, tin, and copper," "lead, copper, and fish," for I was informed by the way that large salmon have been seen close to this celebrated mine. But my object is more particularly to speak of the unmistakeable identity of the Van lode for many miles to the west. And next, I believe, in that direction is the old Bryntail, now known under the name of VAN CONSOLS, and I have reason to believe, not alone from personal examination, but from opinions given by trustworthy men as to the unusually strong indications of riches in the lodes in this grant long before it bore its present fashionable name. And the present company seems to be working with a will and determination to fully develope this fine property.

The next property on the Van lode seems to bear the name of ABERDAUNANT. Of this I have only to say at present that there can be no mistake as to its being the Van lode; but, in addition, there seems an important feature in this grant—a junction of the Golfron lode with the Van, and, if I am correctly informed, this Golfron has been very productive in a rich quality copper in former times.

I now cross the Severn river to the west, and examine a mine lately named VAN UNITED; and, after a careful examination of the property, I have no hesitation in saying that there is sufficiently strong evidence of the productive nature of this lode to warrant a most vigorous prosecution of mining operations. Considerable work has been done upon it by former parties, but in a most crude manner, still sufficient to show its magnitude and inherent vitality, and is one of those things held in hand, doubtless, by a superior power for the toiling sons of the present generation, to prove again the truth of the phrase, "There is ore for all times, but not for all men."

Having thus traversed over the track of the Van lode westward, I would draw attention to a mine on the north of the last named, but still on the west bank of the Severn. This concern bears the uninviting name of NANTY RICKETT, an application far too ricketty, in my opinion, for a property such as this, for instead of their being disease in the "joints," they are strong in the production of copper of the most beautiful and interesting kind. Here you have the mineral in many varieties, representing the colours of the rainbow. On the back of the lode up in open day, and in a shallow adit, may be seen a strong lode, rich in the yellow sulphuret of copper on the one side, and considerable quantities on the other side of the lode, which certainly has, so far, the finest back of any lode I have seen in this district, and the advantages for working cheaply are not surpassed, if they are equalled, in any undertaking in the country. I think it desirable to say here that I am in no way interested in these mines, and my examination of the latter was a mere accident, as I know no one connected with it; and, further, allow me to say that this is not the Van lode, showing that even in this district men need not depend on the Van alone. R. WILLIAMS.

*Goginan, July 15.*

## MINING IN CARDIGANSHIRE—LISBURNE CONSOLS.

SIR,—For the information of those interested in the above mine, I beg to say that a short time since I visited the property in company with a mine agent in the neighbourhood, of many years standing, and can assure you, Sir, I was highly pleased with the prospects of the mine. The property is very extensive on the course of the (at present) very rich silver-lead lodes of Glogfach, Glogfawr, and other lodes; and as the properties join I consider the prospects exceedingly favourable to their opening up a profitable mine in a short time. The facilities for developing the mines are good, as cross-cuts can be put in from the hill side to intersect the lodes named at a good depth from surface, when the ore can be brought out where there is plenty of water power to prepare it for market; and when I consider the position of the property, with a lode in the shaft worth fully 1 ton 5 cwts. per fathom at so shallow a depth, and the prospects of meeting with rich lodes in the cross-cut now driving, I think the proprietary may congratulate themselves on having a very good property. I sincerely believe, if it be vigorously developed under the present management, the issue will be most satisfactory to all interested. D. R.

## WESTPHALIA, AND THE RHINE PROVINCE.

The rapid progress which has for some years past been making in the development of the mineral industries of Westphalia and the Rhine Province must be well known to the readers of the Journal, from the constant reference which has been made to it in its columns, and it certainly does seem that a stage has now been reached at which no such obstacles as have previously had to be encountered and overcome are likely to be met with. Although no question of the enormous resources for coal, iron, and other mineral products existed, all the difficulties of insufficient means of communication with the principal markets, and inadequate knowledge of the best means of carrying on extensive operations economically, had to be added to those arising from the articles to be offered for sale being unknown beyond the immediate locality in which they were produced, and from the lack of any disposition to apply the amount of capital requisite for securing the diffusion of the necessary information. Now the greater part of the more costly preliminary works have been completed at nearly all the collieries which have been commenced, the requisite sidings and branch lines for the transport of the coal from the collieries have been constructed, new lines have been made or commenced wherever a proper opening existed for them; and, above all, arrangements have been made with the principal railways for the transport of the coal at a tariff with which the coal masters may well be satisfied.

And this extraordinary progress is, doubtless, in a great measure attributable to the energetic exertions of the "Verein für die bergbaulichen Interessen im Oberbergamtsbezirk Dortmund," or, as we may call it for brevity, the Dortmund Mine Owners' Association. This very useful society has been in existence for upwards of ten years, and at the recent general assembly of its members, Dr. HAMMACHER, the President, gave a most interesting account of the changes which had taken place in connection with the mineral industries of the district since the association was inaugurated. Ten years ago the Dortmund district was in a very critical position. All the dangers of approaching over production lay before it. Coal mining had commenced to develope itself into a great industry, whilst it was hedged in and impeded on all sides. But how great has been the progress since made! From 20,000,000 tonnen in 1859 the annual production of the Netherrhenish-Westphalian coal basin has increased to 45,000,000 tonnen. In 1859 employment was given to but 27,000 workmen, yet now nearly 50,000 are provided for. And everything has gone forward in regular progression. One can also observe a very significant improvement in the fact that whilst ten years ago each workman represented a daily production of 2½ tonnen, the present get is 3½ tonnen per man per day. In 1859, too, the markets for the coal were very limited. The deeply-felt necessity for enlarging the market offered the greatest inducement for the establishment of the society, and gave it during the earlier years of its existence a fruitful field for labour. The constant efforts of the association were crowned with success, even when many who should have supported it had not the courage to assist. Ten years ago scarcely 300,000 centners of coal and coke was sent from the district into North Germany, and the country between the Ems, the Weser, and the Elbe was supplied with English coal. Now, the Netherrhenish-Westphalian mines send from 12,000,000 to 15,000,000 centners there, and supply almost the whole of the fuel for the Bremen steamers, and much for those of Hamburg.

But this was only possible after the introduction of the one pfennig tariff on the railways, and after the laying aside of many prejudices. We remember, continues Dr. Hammacher, the great exertions which were made by the association, and then goes on to state that already the profit derivable from the one pfennig tariff has ceased to be disputed by railway managers when the distance which the fuel has to be carried is considerable, and the construction of the North German Federation has sanctioned it; and it is unquestionable that the Westphalian coal owners are indebted to the extension of the cheap transport arrangements generally for the possibility of disposing of the present and continually increasing production. The Bergish-Markish Railway Company has displayed during the last ten years a most careful attention for the western provinces, and especially for the mining districts. With insufficiently acknowledged dexterity, and with great energy and prudence, it has extended and completed its network of lines, and improved the economical position of its affairs. The Rhenish Railway Company has no less successfully exerted itself in solving the problem of affording accommodation to the Westphalian industry through the Osterath-Essen Railway, and thus breaking up the sorry railway monopoly of

the Cologne and Minden district, under which Westphalian mining was depressed. To this company the mining interest is greatly indebted for the satisfactory tariff now enjoyed, and for the branch lines which have been brought into the very works.

Seeing how much the Dortmund Mine Owners' Association has done, it is not surprising that the President should avail himself of the opportunity offered by the completion of its first decennium to congratulate the members that the labours of the association have not failed to produce fruit. Is its task now full filled? that could one ask. The answer lies in the daily-arising troubles and necessities for reform. The President considered that those engaged in the working of the mines must be united and free from prejudices, and that, especially, full attention should be devoted to the improvement of the moral and social position of the workmen. Without the exercise of this duty the dark clouds of workmen's agitation may be drawn over the local industry, and give rise to unnecessary difficulties. And as an evidence of what combined power can and will do the steps taken at the meeting of the association affords ample evidence. The erection of a suitable building wherein to conduct experiments for testing the value of the coal was determined upon, and the hope was expressed that this would be but the beginning of a series of similar steps calculated to demonstrate the applicability of the coal to steam-generating purposes, and to secure it a high reputation in the markets in the world. In comparatively few districts have the colliery proprietors and others interested in the development of local resources worked so harmoniously together, and but seldom have such unquestionably successful results been so speedily obtained.

The knowledge of these facts is of especial importance at the present time, considering that one of the most influential companies in Westphalia, worked with British capital, and it might be added British energy, is seeking to raise, by the issue of a class of security (which is most favourably known on the Continent, and which we fully describe and comment upon in another column), the additional capital necessary to complete the establishment of the enterprise as a permanently-paying concern.

## FOREIGN MINING AND METALLURGY.

Notwithstanding the advanced period of the season, quotations display firmness in the St. Dizier district. The demand continues to be well maintained for sheets, special irons, &c., and prices are firm. Rolled coke-made iron is quoted at 8*l.* 4s. to 8*l.* 8s. per ton; first-class sheets stand at 9*l.* 12s. to 10*l.* per ton. Charcoal-made iron, although somewhat neglected, brings 8*l.* 16s. to 9*l.* 8s. per ton, according to the works; fine-grained iron and refined charcoal-made iron has given rise to some transactions at 11*l.* 12s. to 12*l.* per ton for the first, and 13*l.* 4s. to 13*l.* 8s. for the second. The foundries continue to have plenty of work, and some of them have even increased the price of various articles. The works of the Nord, the Meurthe, and the Moselle have presented no noticeable feature during the last few days: we may note, however, the Marquise Foundries Company, which is proprietor of the Fourmies iron minerals concession, has solicited a rather considerable extension of it; also that the Pont-à-Mousson works, in the Meurthe, have just lighted their fourth blast-furnace. A good current of affairs continues at Paris, and quotations for iron are well sustained, at about previous rates. We announced recently that MM. de Wendel and Sons, of Hayange, had concluded with the Eastern of France Railway Company a contract for 30,000 tons of rails at 7*l.* 14s. per ton in warehouse at the works. Last year the same company paid in a contract of about the same importance 6*l.* 18s. per ton; the difference of 16s. per ton is a decisive illustration and proof of the gradual advance which has been taking place in rails during the last 12 months. MM. Verdié and Firminy have received an order from the Western of France Railway Company for 10 tons of steel crossings at the rate of 24*l.* per ton, delivered at Paris. The Viceroy of Egypt has ordered from J. F. Cail and Co. a great quantity of machinery to be used in connection with the production of sugar; the amount of the order thus given out by His Highness is stated to be about 600,000*l.* MM. Jollet and Balin, of Nantes, have secured a contract for the reconstruction of the ironwork of the Oudon bridge. M. Jolly, of Paris, is about to proceed with the construction of three covered markets at Lille, which will comprise a great deal of ironwork, and the estimated cost of which is 16,850*l.* The Paris, Lyons, and Mediterranean Railway proposes to gradually substitute Bessemer steel rails for iron rails on its lines from Paris to Marseilles, Tarascon to Nimes, and St. Etienne to Lyons.

The metallurgical industry of Belgium continues in a prosperous state. Rolled irons remain quoted at the following rates:—No. 1, 6*l.* 16s.; No. 2, 7*l.* 8s.; No. 3, 8*l.*; and No. 4, 8*l.* 16s. per ton. Large plates remain at 9*l.* per ton for No. 2, and 9*l.* 16s. per ton for No. 3. The Belgian works continue well employed, and would find it impossible to undertake the execution of orders to be carried out in a given period; still it is doubtful whether the pretensions of Belgian ironmasters are not somewhat exaggerated. As regards the Belgian coal trade, it may be remarked that prices remain without variation; it is understood that several important contracts, which have remained in suspense in expectation of a probable depreciation in prices have just been definitively concluded. The stocks on hand in the Belgian basins have been declining of late, especially in the Charleroi district. The deliveries of coal from Ruhrort and Duisbourg to Belgium are declining more and more; in May only 1626 tons were thus exported; while in May, 1868, the corresponding total amounted to 5015 tons. It would seem, then, that the demand for Westphalian coal in Belgium does not present the elements of permanency. The Chief Director of Mines, writing on the difficulties experienced by the coal workers of the Couchant de Mons in 1868, states that in the course of last year the 24 coal working companies of the Couchant extracted in round figures 3,300,000 tons, at a total cost of 1,492,000*l.*; while the coal sales effected during the year produced 1,548,000*l.*, leaving a profit of 56,000*l.*, or about 4d. per ton. Twelve companies realised between them a profit of 99,200*l.*, but the others contrived to lose about 43,000*l.* between them, leaving the general profit at 56,000*l.*, as already indicated. The capital engaged having been about 3,200,000*l.*, the return realised was at the rate of only about 1¾ per cent. per annum,—a totally inadequate result, more especially when it is borne in mind that coal mining must one day or other come to an end in the district, and that some provision ought consequently to be made for redemption of capital. The Ougrée Iron Works Company has been paying this month its dividend for 1868,—16s. per share. The Corcelles-Nord Collieries Company commenced the payment on Thursday (July 15), of the balance of the dividend for 1868,—3*l.* 4s. per share.

Copper has not experienced much change upon the French markets. At Havre 69*l.* per ton has been given for disposable Chilian in bars, Paris conditions. At Paris, Chilian in bars has made 68*l.* 16s. to 69*l.* per ton; ditto in ingots, 74*l.* per ton. The German markets have been quiet, but have presented tolerably well maintained prices. Banca and Straits tin have nearly maintained previous rates at Paris and Havre; there was, however, a downward tendency at the last dates. The German tin markets have exhibited a general fall. The improvement recently noted in Banca at Rotterdam has not been maintained, prices having receded from 79½ fls. to 79 fls. The Rotterdam market has been extremely quiet, and unless prices are materially reduced no improvement is anticipated in the demand. Billiton is offered at 77 fls.; the market has been somewhat over supplied. Nothing very striking has transpired in tin at Amsterdam; notwithstanding the scantiness of transactions, prices have not given way to any material extent. Lead maintains former rates. At Havre Spanish has made 19*l.*, and lead from other sources 19*l.* 4s. to 19*l.* 6s. per ton. At Hamburg there have been no transactions in lead of any importance; at the same time, prices have been well maintained. No change has occurred in zinc at Havre or Paris; on the German markets the tendency has been less firm, and offers have been made at somewhat lower rates. The price of rolled Vieille-Montagne zinc has been reduced this month from 28*l.* to 26*l.* per ton on the Belgian and Dutch markets.

The annual report of the Zwickau (Prussia) Coal Mining Association states that in 1868 the mines worked produced 275,840 wagons of coal (or 22,179 more than 1867), and 1468 tons of iron minerals. The production of briquettes comprised 11,264 wagons of coal, converted into 4,249,000 briquettes. The Hungro-Belgian Company for the Construction of Engines and Ships has just held its annual meeting for 1868-9, at Pesth. The company has acquired certain works at Brunn and Neupesth; and at the close of December the Brunn establishment possessed 17 new steam-engines, of a total force of 1060-horse power; the number of workpeople employed in the establishment averaged 114. The receipts last year were 46,929*l.*, and the expenses amounted to 44,140*l.*, showing a balance of 2789*l.* After deducting certain *tantièmes*, there remained a definitive surplus of 1714*l.* The profit realised at the Neupesth Works, which employed last year an average of 212 workpeople, amounted last year to 2751*l.* The dividend for 1868 will be 12s. per share. It appears from the report of the directors of the Spanish Credit Mobilier that the working of the Barruelo Coal Mines by the undertaking was attended with improved results last year as compared with 1867. Thus the sale of products amounted in 1868 to 50,301 tons, as compared with 31,614 tons in 1867, showing an increase last year of 18,687 tons. The causes of this development are to be found in the increase of the general trade sales effected last year, and in the deliveries made to several railway companies. A sensible improvement having been realised last year in the cost of extraction, the results of the past year show a suitable remuneration on the capital engaged. The extraction shows a further increase this year.

The consumption of English coal in Berlin and the Prussian inland provinces has for some years past shown a gradual diminution, owing to the increasing use of Silesian and Saxon (Zwickau) coals. Notwithstanding this, the whole importation of English coals into the Zollverein from 1857 to 1867 shows an augmentation of 4,418,300 centners, or 22 per cent., an increase entirely owing to the very large consumption of these coals in the maritime provinces of Prussia, which can procure them cheaper by sea from England than from the interior or from Saxony by land carriage. In the ports of the North German Confederation English coals are yearly becoming more important as an article of commerce. In 1867 Lübeck imported 22,299 tons; Memel, 35,319; and Neufahrwasser, 16,840; or, together, 74,458 tons of English coals; and there is not a single Baltic port in which their purchase and sale do not give rise to large transactions every year.

In Great Britain, in 1867, 3195 coal pits, with 333,116 workmen, produced 105,078,000 tons, or 2,133,083,000 zollcentners. In 1868 the production had fallen to 104,500,000 of tons, or 2,121,000,000 zollcentners, while the number of pits had risen to 3291, and that of the miners to 346,820. In Prussia, during the year 1867, 426 pits, with 102,773 workmen, produced 420,571,116 centners of coals, and in 1868, with 106,348 men, they yielded 454,486,660 centners. While the coal production of Great Britain in the year 1854 was ten times greater than that of Prussia, being 64,661,000 tons, or 1,312,618,300 centners, against 136,225,096 centners, in 1867, it was only five times as great, and in 1868 only 4·6 times. Leaving out of account the recent territorial acquisitions of Prussia, we find the production of coals in the old provinces amounted in 1868 to 4·7 of that of Great Britain. While the amount of coals raised in the latter country from 1854 to 1868 increased by 40,000,000 of tons (812,000,000 of centners), or 62 per cent., it rose in the old Prussian provinces to no less than 310,379,729 centners, or 227·8 per cent.

The average yield of a coal pit in Great Britain in 1867 was 667,000 centners, and 644,000 centners in 1868; in Prussia it was 987,000 centners in 1867, and 1,067,000 centners in 1868. On the other hand, the average quantity raised by each miner in the two years was 6398 and 6116 centners in Great Britain, and 4092 and 4273 centners, or 43 per cent. less, in Prussia.

The proportion of accidental deaths of miners in 1867 was 1 in 280, and for every 1,792 499 centners of coals produced in Great Britain; in Prussia one man in 352·5, and for every 1,440,157 centners raised. Of the entire accidents in British mines in 1867, 24·3 per cent. were caused by explosions, against 13·31 in Prussian pits; 37·73 per cent., against 36·13 in Prussia, by earth-slips; 17·73 per cent., against 25·26 in Prussia, by other accidents underground; 7·49 per cent. against 3·7, by accidents above ground; and 13·11 per cent. against 22·18, by accidents in the shafts.

## GRYLLS'S ANNUAL MINING SHEET.

FROM JUNE 30, 1868, TO JUNE 30, 1869.

Containing the Quantity of Copper Ore sold from each Mine, British and Foreign—Average Price per 21 cwts., and the Amount of Money—The Average Standard, Produce, and Price for the Year, both in Cornwall and Wales—The Total Amount of Ore, Fine Copper, and Money—Each Company's Purchase—And the Particulars of Copper Ores sold at the Ticketings in Cornwall from June 30, 1850, to June 30, 1869.

CORNWALL.

| Mines. | Ore. | Amount. | Price. |
|---|---|---|---|
| Bampfylde .....Tons | 306 | £ 2,993 9 6 | £ 9 15 6 |
| Basset, Wheal ..... | 1,623 | 7,719 10 6 | 4 15 0 |
| Bedford United Mines .... | 1,062 | 2,879 1 6 | 2 14 0 |
| Belstone Mine ..... | 179 | 1,026 13 0 | 5 14 6 |
| Botallack Mine ..... | 272 | 1,721 12 0 | 6 6 6 |
| Brookwood..... | 539 | 1,576 6 6 | 2 18 6 |
| Buller, Wheal ..... | 142 | 643 0 6 | 4 10 6 |
| Busy, Wheal ..... | 57 | 115 1 0 | 2 0 6 |
| Camborne Vean ..... | 50 | 104 16 0 | 2 2 0 |
| Carn Brea Mines ..... | 2,189 | 10,168 4 6 | 4 13 0 |
| Carn Camborne ..... | 436 | 877 4 0 | 2 0 0 |
| Cawsand Vale ..... | 120 | 410 2 6 | 3 8 6 |
| Clifford Amalgamated .... | 7,919 | 29,192 10 0 | 3 13 6 |
| Copper Hill ..... | 485 | 1,611 7 0 | 3 6 6 |
| Craddock Moor..... | 961 | 4,456 3 6 | 4 12 6 |
| Crebor, Wheal ..... | 268 | 992 3 6 | 3 14 0 |
| Crelake, Wheal ..... | 1,353 | 4,130 9 0 | 3 1 0 |
| Crenver & Wheal Abraham | 2,608 | 6,530 17 0 | 2 10 0 |
| Crinnis Consols ..... | 80 | 433 17 0 | 5 8 6 |
| Devon & Cornwall United. | 225 | 694 19 6 | 3 2 0 |
| Devon Great Consols ..... | 18,542 | 74,347 6 0 | 4 0 0 |
| Dolcoath ..... | 172 | 857 2 6 | 5 0 0 |
| East Wheal Basset ..... | 210 | 1,258 14 6 | 6 0 0 |
| East Caradon ..... | 2,365 | 9,738 10 0 | 4 2 6 |
| East Carn Brea..... | 1,140 | 3,486 12 0 | 3 1 0 |
| East Pool ..... | 1,753 | 4,815 0 6 | 2 15 0 |
| East Rosewarne ..... | 944 | 3,936 1 0 | 4 3 6 |
| East Russell ..... | 294 | 1,161 6 6 | 3 19 0 |
| East Wheal Grenville..... | 580 | 2,589 13 6 | 4 9 6 |
| Emily Henrietta, Wheal .. | 640 | 2,974 11 6 | 4 13 0 |
| Falmouth and Sperries.... | 140 | 624 4 0 | 4 9 0 |
| Feock Regulus ..... | 120 | 275 0 0 | 2 6 0 |
| Friendship, Wheal ..... | 790 | 3,054 8 0 | 3 16 6 |
| Gawton Copper Mine ..... | 837 | 3,039 16 6 | 3 12 6 |
| Glasgow Caradon ..... | 1,784 | 6,723 2 6 | 3 15 6 |
| Gonamena ..... | 544 | 2,213 17 0 | 4 1 6 |
| Great North Downs ..... | 1,845 | 8,696 9 0 | 4 14 6 |
| Great South Tolgus ..... | 316 | 994 12 6 | 3 3 0 |
| Gunnis Lake (Clitters) .... | 570 | 3,129 11 6 | 5 10 0 |
| Hingston Down ..... | 326 | 797 15 0 | 2 9 0 |
| Kelly Bray Mine ..... | 808 | 3,982 15 6 | 4 18 6 |
| Levant Mine..... | 161 | 1,226 17 6 | 7 12 6 |
| Margery, Wheal ..... | 329 | 939 7 0 | 2 10 0 |
| Marke Valley ..... | 5,665 | 22,973 6 0 | 4 1 0 |
| Mary Florence, Wheal .... | 55 | 185 1 6 | 3 7 6 |
| New Treleigh ..... | 142 | 472 1 6 | 3 6 6 |
| North Wheal Crofty ..... | 99 | 522 12 0 | 5 5 6 |
| North Downs ..... | 719 | 4,108 17 0 | 5 14 6 |
| North Grambler ..... | 235 | 1,231 11 0 | 5 5 0 |
| North Pool..... | 65 | 335 19 6 | 5 3 0 |
| North Roskear..... | 349 | 1,822 18 6 | 5 4 6 |
| North Treskerby ..... | 904 | 3,981 10 0 | 4 8 0 |
| Okel Tor ..... | 1,780 | 4,839 2 6 | 2 14 6 |
| Old Gunnis Lake..... | 60 | 250 4 0 | 4 3 6 |
| Par Consols ..... | 824 | 2,811 9 0 | 3 8 0 |
| Pennance ..... | 201 | 494 0 6 | 2 9 0 |
| Phœnix Mines ..... | 2,378 | 10,714 19 6 | 6 10 0 |
| Poldice Mines ..... | 1,380 | 5,614 14 6 | 4 1 6 |
| Prince of Wales ..... | 1,354 | 7,665 18 6 | 5 12 6 |
| Prosper United Mines .... | 1,952 | 4,052 15 0 | 2 1 6 |
| Rose, Wheal ..... | 740 | 2,777 6 6 | 3 15 0 |
| Rosewarne Consols..... | 65 | 309 12 6 | 4 15 6 |
| Russell, Wheal..... | 139 | 351 13 6 | 2 10 6 |
| Seton, Wheal ..... | 4,239 | 13,138 19 0 | 3 2 0 |
| Sortridge Consols ..... | 50 | 246 2 0 | 4 18 6 |
| South Caradon ..... | 6,234 | 48,411 18 6 | 7 15 6 |
| South Condurrow ..... | 75 | 526 14 0 | 7 0 6 |
| South Crofty ..... | 2,937 | 9,378 18 6 | 3 4 0 |
| South Frances ..... | 665 | 3,517 18 6 | 5 6 0 |
| Sundry small mines ..... | 940 | 3,759 15 0 | 4 9 0 |
| Tincroft ..... | 252 | 954 8 0 | 3 15 6 |
| Tresavean ..... | 164 | 493 19 6 | 3 0 0 |
| Tywarnhaile..... | 73 | 217 3 0 | 2 19 6 |
| West Basset ..... | 1,372 | 5,511 6 6 | 4 0 6 |
| West Caradon ..... | 632 | 2,556 3 6 | 4 1 0 |
| West Damsel ..... | 1,199 | 4,627 16 0 | 3 17 0 |
| West Great Work ..... | 67 | 272 11 0 | 4 1 6 |
| West Maria & Fortescue .. | 1,092 | 3,817 0 6 | 3 10 0 |
| West's Ore ..... | 134 | 627 12 0 | 4 13 6 |
| West Wheal Seton ..... | 6,670 | 32,951 17 6 | 4 19 0 |
| West Wheal Tolgus..... | 1,255 | 5,095 12 6 | 4 1 0 |
| WALES. | | | |
| Argentiferous Regulus .... | 68 | £ 1,330 15 0 | £19 11 6 |
| Ashes ..... | 95 | 334 17 6 | 3 10 6 |
| Agambugeria ..... | 109 | 2,180 19 0 | 20 0 0 |
| Ballycummisk ..... | 505 | 3,015 18 6 | 15 19 6 |
| Berchavan ..... | 4,278 | 25,148 3 6 | 5 17 6 |
| Bolivian Ore..... | 380 | 5,303 16 0 | 13 19 0 |
| Bolivian Regulus ..... | 274 | 7,562 5 6 | 27 12 0 |
| Bradda Mining Company.. | 65 | 580 2 6 | 8 18 6 |
| Cawsand Vale Mine ..... | 98 | 376 13 0 | 3 17 0 |
| Cape Ore..... | 1,880 | 42,001 14 6 | 22 7 0 |
| Chili Ore..... | 65 | 1,545 9 6 | 23 15 6 |
| Cobre ..... | 1,049 | 13,424 11 0 | 12 16 0 |
| Copper Ore..... | 208 | 3,050 8 0 | 14 13 6 |
| Copper Regulus..... | 428 | 14,146 16 0 | 33 1 0 |
| Cuba..... | 3,655 | 49,823 10 0 | 13 12 6 |
| Currawang Copper Regulus | 159 | 2,838 11 0 | 17 17 0 |
| Del Soto ..... | 88 | 1,080 4 0 | 12 5 6 |
| Dyliffe..... | 432 | 1,842 15 6 | 4 5 6 |
| Fortune Ore ..... | 83 | 1,027 2 6 | 12 7 6 |
| French Ore..... | 79 | 428 12 0 | 5 8 6 |
| Gwalla Ore..... | 150 | 2,091 1 0 | 13 18 6 |
| Knockmahon..... | 6,748 | 40,999 4 0 | 6 1 6 |
| Lisbon Ore..... | 193 | 2,586 1 0 | 13 8 0 |
| Moonta Ore ..... | 3,995 | 38,739 10 6 | 9 14 0 |
| New Cornwall ..... | 127 | 1,068 3 6 | 8 8 0 |
| Norwegian Ore..... | 105 | 99 18 0 | 0 19 0 |
| Paramatta ..... | 696 | 8,254 0 6 | 11 17 0 |
| Slag ..... | 313 | 435 11 6 | 1 7 6 |
| Sobral Copper Ore ..... | 57 | 653 17 0 | 11 10 0 |
| Spanish Ore ..... | 143 | 1,027 12 0 | 7 3 6 |
| Sundry small mines, &c. .. | 382 | 6,070 3 6 | 15 18 0 |
| Union Mine (Tilt Cove) .. | 2,719 | 17,703 8 6 | 6 10 0 |
| Wallaroo..... | 1,360 | 7,740 4 0 | 5 14 0 |

*Copper Ores sold in Cornwall from June 30, 1868, to June 30, 1869.*

| | | | |
|---|---|---|---|
| Copper ores ..... | 103,199 (21 cwts.) | Average produce ..... | 6¾ |
| Fine copper ..... | 6926 tons 5 cwts. | Average standard ..... | £103 3 0 |
| Amount of money .. | £430,749 10 6 | Average price ..... | 4 3 6 |

Compared with the previous year,

| | | | |
|---|---|---|---|
| Copper ores—decrease. | 18,616 (21 cwts.) | Fine copper—decrease | 1099 tons 4 cwts. |
| Amount of money—decrease .... | £123,280 8 6 | | |

*Copper Ores sold in Wales from June 30, 1868, to June 30, 1869.*

| | | | |
|---|---|---|---|
| Copper ores..... | 30,986 (21 cwts.) | Average produce..... | 14¼ |
| Fine copper..... | 4436 tons. | Average standard ..... | £84 7 0 |
| Amount of money.... | £304,511 19 6 | Average price ..... | 9 16 6 |

Compared with the previous year,

| | | | |
|---|---|---|---|
| Copper ores—decrease.. | 5951 (21 cwts.) | Fine copper—decrease | 1603 tons 12 cwt. |
| Amount of money—decrease .... | £133,278 15 6 | | |

*Totals in Cornwall and Wales.*

| | | | |
|---|---|---|---|
| Copper ores ..... | 134,185 (21 cwts.) | Fine copper ..... | 11,362 tons 5 cwts. |
| Amount of money ..... | £735,261 10 0 | | |

Compared with the previous year,

| | | | |
|---|---|---|---|
| Copper ores—decrease | 24,567 (21 cwts.) | Fine copper—decrease | 2702 tons 16 cwt. |
| Amount of money—decrease .... | £236,559 4 0 | | |

*Copper Ores Purchased by the Copper Companies from June 30, 1868, to June 30, 1869.*

| Purchasers. | Tons ore. | Tons copper. | Amount. |
|---|---|---|---|
| Vivian and Sons ..... | 22,404 | 1736 2 | £111,076 1 9 |
| John Freeman and Copper Company | 8,780 | 810 3 | 53,220 8 3 |
| Pascoe Grenfell and Sons ..... | 14,120 | 1445 0 | 95,713 9 8 |
| Sims, Willyams, Nevill, and Co.... | 13,109 | 1450 11 | 96,423 11 0 |
| Williams, Foster, and Co..... | 21,942 | 2063 0 | 136,134 13 3 |
| Mason and Elkington ..... | 13,708 | 1000 9 | 63,378 18 10 |
| Bankart and Sons..... | 7,102 | 432 3 | 26,486 5 9 |
| Copper Miners' Company ..... | 14,288 | 1031 14 | 65,049 16 6 |
| Charles Lambert ..... | 8,192 | 655 9 | 41,647 13 10 |
| Newton, Keates, and Co. ..... | 824 | 60 14 | 3,848 12 4 |
| Swansea Vivian and Smelting Company | 132 | 4 10 | 252 12 3 |
| Goole Ar... ...gn Copper Company. | 17 | 10 14 | 728 16 6 |
| British & For... Company ..... | 62 | 19 12 | 1,340 1 0 |
| Ravenhead Copper Company ..... | 92 | 32 3 | 2,196 8 6 |

*Sold at Ticketings in Cornwall from June 30, 1850, to June 30, 1869.*

| Date. | Ore. | Money. | Produce. | Standard. |
|---|---|---|---|---|
| 1850..... | 150,890 ..... | £ 814,037 3 0 ..... | 7¾ ..... | £ 92 11 0 |
| 1851..... | 154,299 ..... | 808,244 1 6 ..... | 7⅞ ..... | 103 19 0 |
| 1852..... | 152,802 ..... | 828,057 19 6 ..... | 7⅞ ..... | 101 0 0 |
| 1853..... | 180,095 ..... | 1,124,561 2 0 ..... | 6⅞ ..... | 106 12 0 |
| 1854..... | 180,687 ..... | 1,153,756 3 6 ..... | 6¼ ..... | 136 16 0 |
| 1855..... | 188,969 ..... | 1,212,686 8 0 ..... | 6½ ..... | 140 2 0 |
| 1856..... | 209,305 ..... | 1,283,639 8 6 ..... | 6⅜ ..... | 141 10 0 |
| 1857..... | 198,697 ..... | 1,276,844 12 0 ..... | 6½ ..... | 140 0 0 |
| 1858..... | 183,292 ..... | 1,083,728 18 6 ..... | 6⅜ ..... | 139 6 0 |
| 1859..... | 183,944 ..... | 1,079,075 17 0 ..... | 6⅜ ..... | 133 6 0 |
| 1860..... | 180,448 ..... | 1,079,403 4 6 ..... | 6½ ..... | 133 18 0 |
| 1861..... | 176,097 ..... | 1,013,400 5 6 ..... | 6½ ..... | 130 1 0 |
| 1862..... | 186,662 ..... | 977,017 2 6 ..... | 6¼ ..... | 127 13 0 |
| 1863..... | 176,285 ..... | 872,474 4 6 ..... | 6⅜ ..... | 120 9 0 |
| 1864..... | 166,707 ..... | 858,586 1 0 ..... | 6¼ ..... | 124 17 0 |
| 1865..... | 164,940 ..... | 806,833 10 0 ..... | 6⅛ ..... | 125 3 0 |
| 1866..... | 148,777 ..... | 678,641 3 0 ..... | 6⅛ ..... | 118 7 0 |
| 1867..... | 125,679 ..... | 547,689 8 6 ..... | 6⅜ ..... | 107 1 0 |
| 1868..... | 121,815 ..... | 554,029 19 0 ..... | 6⅜ ..... | 110 15 0 |
| 1869..... | 103,199 ..... | 430,749 10 6 ..... | 6¼ ..... | 103 3 0 |

## MINING IN AUSTRALASIA—MONTHLY SUMMARY.

*Adelaide, June* 21.—Fresh discoveries of copper have been made.

GOLD.—Never since the first opening of the Yatta gold field have the expectations of the diggers been raised to so high a pitch as during the past week. It is now no longer doubted by the majority of diggers that the Barossa diggings will be a permanent gold field. The *Gawler Times* says—"There can be no doubt that a large quantity of gold has been and is still being raised on the Barossa diggings. We were surprised lately to see at the English, Scottish, and Australian Chartered Bank a nice little parcel of 450 ozs. of gold. This is in addition to about 1500 ozs. which have already been sent to England by this bank, and irrespective of the purchases made by others. Amongst the finer gold were several good nuggets, weighing from about 5 dwts. to nearly an ounce. Besides the Barossa gold, we saw several ounces from Jupiter; also some pretty specimens from Yankalilla, the largest of which we should think weighed 7 or 8 dwts., and was of a beautiful bright colour. We were also shown one or two small pieces, said to have been found in the scrub not far from Goolwa. One of these was attached to a bit of milk-white quartz, similar to the Victorian gold quartz. We understand, even in these dull times on the diggings, the English, Scottish, and Australian Chartered Bank have purchased gold at the rate of 30 or 40 ozs. a week."

SILVER.—Satisfactory reports are still being received from the silver mines. New and powerful machinery has just been erected at the Almanda, by means of which it is expected that operations will be carried on with great rapidity. A week or two ago a panic was caused in the market, so far as Almanda shares were concerned, by the intelligence that a large amount of copper had been found in the bars. This, however, has now been allayed. The Potosi proprietors are hard at work erecting machinery, and the Colorado shareholders are still held in suspense as to whether their lode will turn out stuff of sufficient richness to justify the erection of machinery and plant.

SILVER-LEAD.—The local correspondent of the *Southern Argus* says—"The Talisker Mine is the only topic we have to write about. I am happy to say that 'she' is looking very 'keenly,' as a Cornishman would say. The engine-shaft is being sunk by nine men, and is now 336 feet deep. The ground is hard and 'sparey.' It is intended to push on the sinking until a depth of 380 feet is reached, at which point drives will be extended east and west to intersect the several lodes known to exist in those directions, and from which great results are expected. During the last three years nearly 500 tons of silver-lead, in ingots, have been produced from this mine, containing upwards of 40,000 ozs. of pure silver. It is rumoured that the company is about to be amalgamated with an English company, and then carry on their works on a much larger scale. This company has shown more pluck than any colonial company in the colony; and it is the hope, and I may say the opinion, of one and all here, that they will be well paid for their perseverance and pluck."

COPPER.—There is a steady growth perceptible in the mining industry of Yorke Peninsula. Undeterred by the news of the fall in the copper, mining men appear to be inspired with the idea of making up with quantity that which they lose by a deterioration in value. From the two great mines—the Moonta and the Wallaroo—there comes no news differing much from previous reports. The directors of the Moonta have declared a 5*l.* dividend per share; and as the Wallaroo company is raising an immense amount of ore, it is reasonable to suppose the proprietors have good cause to be satisfied with the works that are being carried on. Besides the amount of ore that is smelted on the Peninsula, the Black Diamond liners, of which we sometimes have half a dozen or more in port together, are, as a rule, supplied with ore for back carriage on their voyage to Newcastle; coasting traders relieve us of some; and during the past few months we have generally had two or three London vessels in port receiving cargoes of ore. It is believed that another new lode has been found upon the Moonta property, and as this is not the first discovery of the kind made lately, the property of the company must be held to have recently increased in value very materially. The Paramatta Company sent 500 tons of ore away during the past month, and when its more powerful appliances are erected increased yields from this mine may be certainly calculated upon. There are favourable reports to hand from the Yelta; the Wheal Hughes is raising very good ore; the Poona is doing likewise, the Wheal James has got the lode it has so long been looking for, and quite a number of smaller mines are being vigorously worked. The North-East Moonta Company, which should be a giant one, as it leases 34 sections, has accepted a tender to costean over the length of its property; and, in addition, it offers a reward of 500*l.* for the discovery of a good lode. The New Cornwall Mine has, after the expenditure of a large amount of money, again got into an ore-bearing lode, and present appearances warrant the belief being entertained that the shareholders will be reimbursed for the capital they have put down."

Capt. Bice, who held a position of some responsibility under the Moonta Mining Company for several years, has been appointed to the management of the Wallaroo Mines, under the supervision of Capt. H. R. Hancock, the manager of the Moonta.

The Blinman Mine continues to send forward large supplies of copper, and during the depression in the Far North and at Port Augusta this mine has been the mainstay of the district for the last two years.

At the Morowie Mine the men have been raising a considerable amount of blue carbonate, right from the surface, from a lode that continues to augment in size every foot they sink upon it. Near to the Morowie Mine a claim has been taken out in consequence of the discovery upon it of a composition which has been found to contain a rich alloy of gold and silver; also an admixture of the blue carbonate of copper. The composition is found in abundance on the surface of the soil.—*South Australian Register.*

## AUSTRALIAN MINES.

YUDANAMUTANA COPPER.—Adelaide, May 18: The superintendent states: I am able to report favourably on the smelting department. The metal made since my last to you has averaged 12 tons weekly. With reference to the application of steam-power, previously alluded to, I am having one of the traction-engines thoroughly overhauled, and as soon as a few alterations are completed I shall send it to the mine, and hope soon to have it in full work. I have to report the discovery of fire clay at a short distance from the Yuda Mine, and of which the assayer reports that, "in his opinion, it is a valuable clay for fire-bricks." Wood contracts have been closed in Adelaide for 1500 tons of wood, at 9s., 10s., and 11s. a ton. Capt. Terrell reports, under date May 15—"No 1 Winze: The lode continues the same, yielding good ore.—No. 3 Winze: The stopes in the back of the 25, in the bottom of this winze, are looking well, and we have been getting good work all the month. The stopes south of No. 1 winze are still holding good, while those in the back of the 25, north and south of No. 2 shaft, are looking well—in fact, there is no alteration in the mine generally; if any, the mine is looking better. I am pleased to say the returns are improving. For month ending April 30 copper made, 53 tons 13 cwts. 2 qrs.; dispatched to Port Augusta, 55 tons 6 cwts. 12 qrs.; ore raised, 527 tons; smelted, 527 tons. The furnaces are working well, and everything in this department giving satisfaction. Fire-bricks are being made, and turn out well."

PORT PHILLIP AND COLONIAL GOLD.—Mr. Bland, Clunes May 20: The quartz crushed during the four weeks of April was 5009 tons, yielding 1648 ozs. 11 dwts. of gold, or an average per ton of 6 dwts. 14 grs. Receipts, 6211*l.* 18s. 4d. Payments (including 691*l.* 13s. 8d. on firewood and timber contracts), 5435*l.* 10s. Profit, 776*l.* 8s. 4d., added to which was last month's balance of 520*l.* 0s. 6d., thereby making an available balance of 1296*l.* 8s. 10d. The amount divided between the two companies was 1200*l.*, the Port Phillip Company's proportion of which amounts to 780*l.* The balance of 96*l.* 8s. 10d. was carried forward to next month's account. Return for the two weeks ending May 12:—Quartz crushed 2517 tons, yielding 1031 ozs. 19 dwts. of gold, or on average per ton of 8 dwts. 5 grs. The return for May will be augmented by the results of the treatment of 30 tons of pyrites. Remittance, 1528*l.* 9s. 4d. on general and invoice accounts.

SCOTTISH AUSTRALIAN.—The directors have received advices from Sydney, dated May 19, with reports from the Lambton Colliery to the 17th of that month. The sales of coal for the month of April amounted to 14,420 tons.

AUSTRALIAN UNITED.—The directors have received advices from Mr. Kitto, dated Fryerstown, May 22. He reports:—"Duke of Cornwall Mine: Since my last despatch the new pumping-engine has started, and sinking resumed in Dauke's shaft, which is now about 160 ft. deep; ground rather hard. I intend cross-cutting again from this shaft when a depth of 200 ft. has been reached. The end in the eastern cross-cut from the old shaft is distant 270 ft.; and I have pleasure in reporting that yesterday a branch was cut, and which is shown on the plan sent you as the 'Magazine lode,' and gold is plainly visible in the stone. Before the departure of the next mail I hope to have 24 heads of stamps at work, by which at least 300 tons of stone will be reduced weekly.—Central Mine: The engine at this mine is nearly erected, so that I shall endeavour to strike the lead immediately the pumps are fixed. Attached is a copy of a letter received by me this morning by our mining captain at the mine." In the letter above referred to the captain writes to Mr. Kitto (May 21):—"Yesterday, accompanied by Mr. Rowe, I went over to the London and Melbourne Mine. Capt. Lean kindly showed us over (through) the mine. They are working all together towards us, and are getting better gold than ever—in fact, the last three crushings were excellent, and this week, Capt. Lean thinks, will be better still." Mr. Kitto concludes his despatch by saying: "I think you may safely anticipate declaring a respectable dividend at your January meeting."

[For continuation of Australian Mine Reports see accompanying Journal.]

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